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RECONCILING THE DUAL WORLDVIEWS OF ANCIENT WISDOM AND MODERNITY: COLLABORATIVE-LEARNING IMPLICATIONS FOR FUTURE DISCOURSE

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ABSTRACT

Science, climate change and traditional (or local) knowledge have been at the forefront of many academic and non-academic debates attempting to find discernible or explainable commonalities that exist between opposing worldviews (traditional knowledge/indigenous science vs. Western or Eurocentric Science). Ancient wisdom and modernity have seen their share of controversies over the past decade or more and, in particular, attended by many authors and scientists to explore these two important perspectives. This paper attempts to situate traditional knowledge and modern science by exploring the duality of ancient wisdom and modernity, and, in doing so, creates a better understanding of the importance of these opposing worldviews and how science ancient wisdom and technology/modernism can be interpreted and understood. The paper further explores meaningful interdisciplinary perspectives on how to explain coincidental relationships, components of bridging traditional knowledge/local knowledge (TK/LK) and transforming the compartmentalized view of science within a more holistic understanding of traditional ways of knowing. Lastly, merging Western or Eurocentric Sciences with Traditional Science has important policy implications that justify social-legitimacy through collaborative learning (CL) and integrating system thinking and conflict management.

Keywords: Traditional knowledge; Climate change; Modernity; Indigenous science; Worldviews

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Reconciling the Dual Worldviews of Ancient Wisdom and Modernity: Collaborative-Learning Implications for Future Discourse

1. INTRODUCTION

Humans have evolved on Earth for more than 8 million years. Historians have described behaviour of *Homo sapiens* in terms of their abilities to rationalize thoughts, make decisions and exercise their instincts to survive, adapt and reproduce in harsh or inhospitable conditions through the process of built-resilience and traditional or local knowledge (TK/LK). This seems to be the case wherever they have occupied lands on islands, continents, coastline, or travelled on oceans or navigating rivers. Men, women, families, and communities in many parts of the world have always culturally framed their existence on their ability to integrate or intertwine with our natural world; both spiritually and ecologically. This is because of human's cognitive and non-cognitive abilities to explore, rationalize, search for solutions, and build on practices and belief systems that are reflected in traditional or local knowledge (TK/LK). This TK/LK contains the true (mirror-image) or reflection of culture that is embedded with the land and language (pillars of identify for many Indigenous cultures). Humans have always had an intrinsic ability to adapt (and to eventually adopt) to change and have successfully and unsuccessfully done this in many of the modern advancements in science, technology, innovation. But, there is a 'price to pay' for this anthropogenic advancement or ´modernization´ process. Many impacts have been seen in current generation, but these have much more profound effects on future generations. Humans themselves have intensively changed cultural landscapes and traditions, and, today, many languages and cultures are disappearing along with altering pristine ecosystems, oceans, rivers, and overfishing, over-exploration, or exploitation of resources to the point of species extinction. A legacy of maladaptation seems to supersede our abilities to support and recover cultures, societies, and ecosystems. Climate change (more recently) is 'taking the blame' for anthropogenic and ecologically-induced impacts.

According to the Indigenous Food Systems Network:[1]

> *"The impacts of climate change on Indigenous communities are significant. The cultures that support TK around the world are often living in marginal ecosystems, such as the Arctic, mountains, deserts, and small islands. These marginal ecosystems are often the sources of key ecosystem services (e.g., role of mountain ranges in sustaining water balance) and are critical for maintaining the overall resilience and adaptive capacity of social-ecological systems are most vulnerable to climate change and will suffer the greatest change often for the worse as a result of climate change (p.1)."*

Indigenous peoples' TK or local knowledge is proving critically valuable service to the global community[2]. Sentinel like warning systems

[1] Indigenous Food Systems Network. Indigenous Peoples' Biocultural Climate Change Assessment Initiative (2014). <https://www.indigenousfoodsystems.org/content/indigenous-peoples-biocultural-climate-change-assessment-initiative> accessed on 12 May 2023.

[2] Ibid

for climate change are based on practical observations, oral histories/ narratives, beliefs, ways of knowing, songs, dances, and rituals of social, cultural and ecosystem change by Indigenous peoples. TK/LK is regarded as a traditional science because it is empirical, based on observation and

> *"More importantly, the long-term place-based adaptation approaches developed by indigenous peoples provide valuable examples for the global community of low-carbon sustainable lifestyle, critical to developing local adaptations strategies in the face of climate instability. For example, the Inuvialuit of Northern Canada have observed delays in the autumn freeze, and changing sea ice distribution. Changes in sea ice distribution in turn alter the habitation patterns of seals. Such ecological observations are informing scientists and form part of the science base of studies such as the Arctic Climate Impact Assessment (ACIA)* " [3] (para 3).

The TK/LK and climate change seem to be paradoxically-opposing concepts, but intimately linked via cultures, languages, traditions, belief systems and ways-of-knowing and doing. The only thing that is separating these from being understood in general context, is opposing worldviews, and how traditional knowledge differentiates from other kinds of sciences, or how traditional ways of knowing are not seen within the same context as Eurocentric or western science. The author describes this in more detail in terms of comprehending the breadth of understanding of Indigenous peoples and non-Indigenous western scientists the world over, with the intended audience being natural resource managers, scientists/academics, and traditional knowledge practitioners. One way to approach this (at least in terms of how natural resource managers confront these divergent worldviews) is the creation of a social legitimacy processes through collaborative learning and systems-thinking approaches. These processes can often be validated through transfer of oral and written "ways of knowing," even when there are divergent world views.

The aim of this research paper is to explore the intersection of science, climate change, and traditional knowledge, focusing on the contrasting worldviews of traditional knowledge/indigenous science and Western/Eurocentric Science. By examining the coexistence of ancient wisdom and modernity, the paper seeks to enhance comprehension of the significance of these divergent perspectives and their interpretation of science, technology, and modernism. Through an interdisciplinary approach, the paper aims to uncover connections between these worldviews, bridge the gap between traditional knowledge or local knowledge (TK/LK) and conventional scientific paradigms, and promote a more holistic understanding of traditional ways of knowing. Furthermore, the research will investigate the policy implications of merging western and traditional sciences, emphasizing collaborative learning (CL), systems thinking, and conflict resolution as means to achieve social legitimacy and advancement.

[3] Ibid

2. METHODS

This review was conducted through the use of a qualitative scoping review in addition to an in-depth online literature search. As part of this process, a preliminary assessment of the available literature on a specific subject was carried out with the intention of determining the breadth of the literature, its most important concepts, and the areas where additional research is needed. On the topic of traditional ecological knowledge and climate change, particular literature was gathered by searching electronic databases (e.g. Canadian Centre for Climate Services, IPCC AR6 (6th Assessment Report), NOAA, Australian Climate Change Centre, Climate Change Adaptation, LK data and documents (reports, peer reviewed journals, and theses). An additional literature review and search of studies on policy issues and health due to climate impacts and extreme events, global policy research, LK research and policy implications, loss, and damage and at risks settlements was also done. This search included pertinent literature from The University of the South Pacific (USP), Fiji National University (FNU), The University of Fiji (UniFiji), University of British Columbia (UBC Vancouver, UBC Okanagan), Thompson River University Kamloops Library, LK literature searches worldwide, and the Web of Science database that focused on intergenerational trauma, IRS, climate change adaptation and resilience studies. After that, the information gleaned from the literature review and the qualitative scoping review was subjected to thematic coding with the help of the Nvivo qualitative analysis software. The research covered a wide range of topics, including traditional knowledge, ancient wisdom, folk biology, climate change, environmental law, policy and governance, collaborative learning, climate change impacts and vulnerabilities within the context of numerous communities and socio-cultural circumstances on a global scale.

The results of the review provided a comprehensive and systematic search strategy to identify all relevant literature, using an integrative or critical review approach, to evaluate, critique, and synthesize the literature on a research topic in a way that makes it possible for new theoretical frameworks and perspectives to emerge. The purpose of this review is to create initial or preliminary conceptualizations and theoretical models of developing or novel conceptual or theoretical insights. This article explores the difference between ancient wisdom and modernity places traditional knowledge and modern science in their proper place to help the reader understand how important these two different worldviews are and how science, ancient wisdom, and technology/modernism can be understood and interpreted. The paper also brings to the forefront different conceptual or theoretical fields that can help us understand how coincidences happen, how to connect traditional knowledge with local knowledge (TK/LK), and how to use science to fully understand traditional ways of knowing.

3. ANCIENT WISDOM AND WAYS OF KNOWING

Ancient wisdom or 'ancient ways of knowing is not only sacred but embedded within ancestral power given to those who are ready to receive or use it. This wisdom is the spirit of knowledge that is passed down through the generations often considered sacred and is generated from knowledge handed down through the generations. The wisdom of nature and its surroundings is where Indigenous epistemologies are born. The author believes that this wisdom is a valuable tool, specific to more place-based cultures and languages but it differs in the kind of wisdom we are looking for human intentions. In balance of the nature affected the acquisition of wisdom as the land and its quintessential elements or components have been altered along with what Woodley (2002) describes as being a cognizant model of complex changes in time and space that influence TK/LK (p.11). This authors' view centres in the acquisition and transfer of knowledge and incorporates the continuum of factual and tacit or implicit knowledge (p.22). This continuum can be envisioned as an ongoing force that is intertwined with all human interactions with their environment. This has important implications, particularly with respect to climate change and how would his recognition of these types of knowledge models, helps us explain (from the Indigenous perspective), how these changes can be interpreted. The "traditional system" as Woodley (2002) calls it, that works in the past is synthesized through a cycle of knowledge acquisition supported by inter/intra relationships among context, practices, and belief systems, particular to Indigenous or cultural groups. What is more important, perhaps, is the process of knowledge construction (guided by the experimental and place-based knowledge which is intimately guided by cultural belief systems where wisdom emerges (p.22).

Hoffman (2006) equates as well. The same philosophy in that wisdom is something that is only witnessed in the presence of gifted elders (p.198). Many Indigenous cultures rely on ancient ways of knowing to explain the present, and how this relationship overlaps with other cultures in different tropical or subtropical regions. Indigenous cultures in Northern Europe, Canada, USA and other regions display many variations in ancient wisdom (depending on the culture and language spoken), but a common denominator exists. Most ancient ways of knowing or wisdom are in unique to place and space. In other words, ancient ways of knowing are specific to the Indigenous tribe, groups, community, or peoples themselves and is as diverse as individual identity.

According to Ancient Wisdom Greek mythology had an explanation for Gaia. It was the primordial Earth-Goddess from whom all life sprang, similar Earth Goddess figures are found in most cultures around the ancient world. In the 1970s, James Lovelock (2009) re-introduced the Earth-Mother concept through the medium of Ecology[4]. He proposed that all

[4] Lovelock, J., 'The Vanishing Face of Gaia'. Basic Books (2009), p.163. ISBN 978-0-465-01549-8.

living things are interrelated within the self-regulating systems of the earth, which provides the optimal conditions to support life itself. The 'Gaia' theory has struck a chord in the modern mind and has become a philosophy. In 2008, Lovelock made public his belief that human behaviour has already tipped the scales, and that we are now fast approaching an unprecedented global catastrophe. The same author describes ancient cultures around the world have attested to a belief in a 'female' earth-mother or "Mother Earth".

Figure 1: Earth mother earth symbol (Source: <http://www.ancient-wisdom.co.uk/earthmother.htm>)

Burials placed the bodies back into the ground in a foetal position, and covered the bones in red ochre, supporting the idea of a belief system that considered us as 'returning' to the earth-mother in death (Figure 1).

Figure 2: Tree of Life[5]

Figure 3: Artistic depiction of Tree-lore[6]

3.1 Tree Lore (Sacred Trees)

According to the University of Strathclyde (Glasgow)[7]:

> *"trees offer us mystical connection to our spirituality and play an important role in many mythologies and religions. In ancient traditions all over the world, the tree is a symbol of life itself, representing the totality of a universe in which everything is imbued with spirit. Ancient Celts, for example, planted a tree wherever new communities were established, to provide shelter, food, and medicine, and considered trees to be sacred. The Tree of Life represents harmony and balance in nature, rebirth, and a connection of the earthly and the spiritual. Trees are symbols of strength, individuality and expression, calmness, growth, and the interconnectedness of everything. These are values and concepts which we aim to reflect in our chaplaincy. The colors in our chaplaincy trees also represent inclusion and joy"* (p.1).

Ancient Wisdom[8] also describes "tree lore" as an ancient school of knowledge with roots stretching back into our earliest symbolic imaginations. The Tree is a common universal, archetypal symbol that can

[5] Eldridge, S., 'tree of life'. Encyclopedia Britannica, 10 Aug. 2023, <https://www.britannica.com/topic/tree-of-life-religion> accessed 7 August 2023.

[6] Snively, G., Wanosts'a & Lorna Williams, "Chapter 1 – Braiding Indigenous Science with Western Science. In: Knowing Home: Braiding Indigenous Science with Western Science" (2018), Gloria Snively, Wanosts'a &Lorna Williams. <https://ecampusontario.pressbooks.pub/knowinghome2/> accessed 7 August 2023.

[7] University of Strathclyde., 'Why our symbol is a tree' (2023). <https://www.strath.ac.uk/studywithus/ourcampus/whatsoncampus/faithspiritualitysupport/whyoursymbolisatree/#:~:text=Trees%20offer%20us%20mystical%20connection,everything%20is%20imbued%20with%20spirit> accessed 7 August 2023.

[8] Ibid. Ancient Wisdom (2024) at supra note 3.

be found in many different traditions around the ancient world. Trees are symbols of physical and spiritual nourishment, transformation and liberation, sustenance, spiritual growth, union, and fertility. The tree is a spiritual motif and framework, a map of conception and consciousness that brings together the temporal worlds of time, space, and consciousness. Trees are the places of birth and death; they are used as sacred shrines and places of spiritual pilgrimage, ritual, ceremony, and celebration (Graves (1961)[9].

Sacred trees are found in the Shamanic, Hindu, Egyptian, Sumerian, Toltec, Mayan, Norse, Celtic and Christian traditions. The World-tree is described in The Upanishads as "a tree eternally existing, its roots aloft, and its branches spreading below." How does this relate to TEK/LK and Western Science integration or overlap? The metaphorical "Braiding" of Indigenous Science and Western Science[10] can be used to establish a particular relationship, or "obligation" to give, to receive, and to reciprocate and to learn or appropriate this knowledge. For example, in the First Nations communities in coastal pacific regions of Western Canada, tribes braided cedar bark to make beautiful baskets, bracelets, and blankets. Another analogy is when braiding hair, kindness and love can flow between the braids and often colours are intertwined to represent the seasons and lasting relations (all our ancestral relations).

Accordingly, braiding[11] is linked to certain reciprocity amongst strands, all the strands hold together. Each strand remains a separate entity, a certain tension is required, but all strands come together to form the whole. When we braid Indigenous Science (IS) with Western Science (WS) we acknowledge that both ways of knowing are legitimate forms of knowledge. For Indigenous peoples, Indigenous Knowledge (Indigenous Science) is a gift. It cannot be simply bought and sold. Certain obligations are attached. The more something is shared, the greater becomes its value[12]. These commonalities exist across many Indigenous cultures and peoples.

4. INDIGENOUS SCIENCE AND A "COMMON GROUND' PERSPECTIVE

If we take the tree-lore and braiding example and expand upon this, we can describe this as "Indigenous Science" (IS) or traditional native knowledge (Figure 3) refers to the scientific knowledge of all peoples who, as participants in culture, are influenced by the worldview and interests of their home communities and homelands. According to Ogawa's (1995) theory[13], each culture possesses its own science, which he calls the

[9] Graves, R., 'The White Goddess', pp 61, 123, Faber & Faber, London (1961). Ogham and Tree-lore. <http://www.ancient-wisdom.com/treelore.htm#oghambooklore> accessed 23 June 2023.

[10] Snively, G., Wanosts'a & Lorna Williams, "Chapter 1 – Braiding Indigenous Science with Western Science. In: Knowing Home: Braiding Indigenous Science with Western Science" (2018), Gloria Snively, Wanosts'a &Lorna Williams. <https://ecampusontario.pressbooks.pub/knowinghome2/> accessed 7 August 2023.

[11] Ibid n.1.

[12] Ibid n.1.

[13] Ogawa, M.,'Science education in a multi-science perspective' (1995) 79(5) Science Education 583-593. <http://dx.doi.org/10.1002/sce.3730790507>

"Indigenous science" of that culture. This theory is based on Ogawa's research (p. 585). According to Yamada[14] (1970), a Japanese historian of Oriental science, "every culture and every society has its own science, and its function is sustaining its mother society and culture." Ogawa (1995) cites Yamada's statement in one of his works (p. 585).

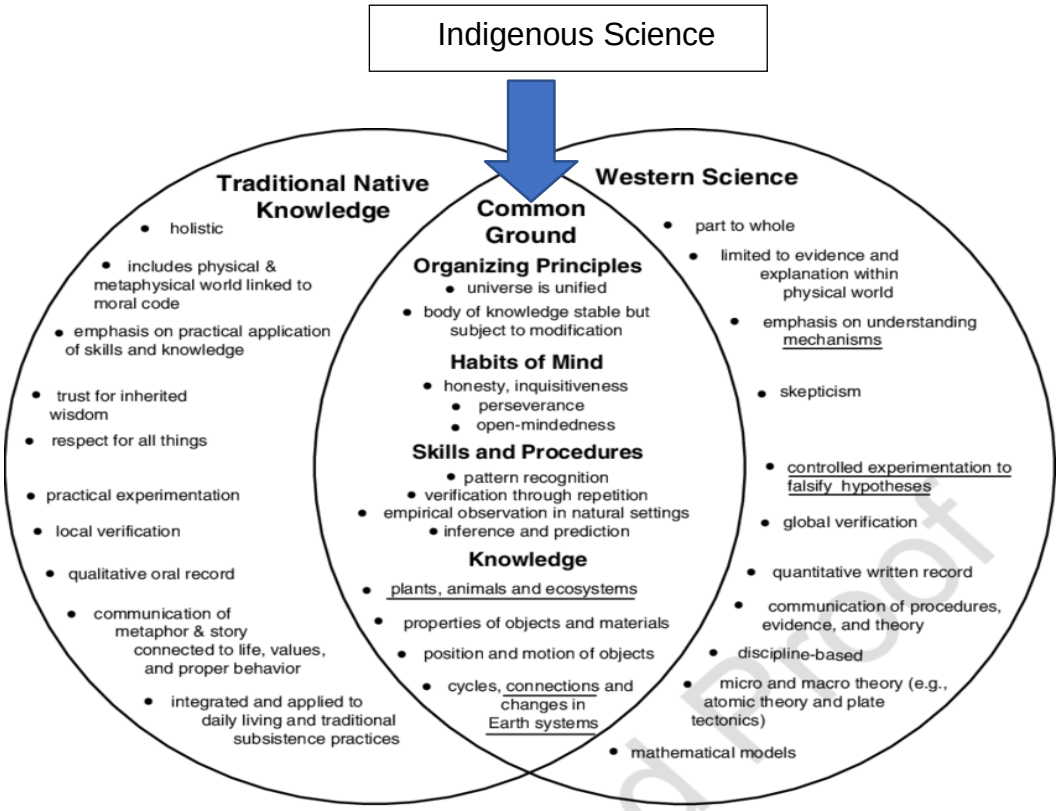

Figure 4**:** Intersection of Indigenous Science with Traditional Native Knowledge and Western Science. This schematic also highlights similarities and differences between traditional Native knowledge and Western Science (Modified with permission from Stephens (2000) [15] in Chapin et al (2013) with the modifications underlined).[16]

It is interesting to note that the component of Indigenous Science (or IS) known as traditional wisdom, which encompasses the values and methods of decision-making related to scientific knowledge, contains a particularly rich variety of tried-and-true methods that promote

[14] Yamada, K., 'Pattern-Ninshiki-Seisaku: Chugoku kagaku no shisotekLKi fudo (Pattern - Recognition - Production: Philosophical climate of Chinese science)', in T. Hiroshige (Ed.), Kagakushi no susume (Invitation to the history of science), Tokyo: Chikuma Shobo Ltd., 73 -139 (1970).

[15] Stephens S, 'Handbook for culturally responsive science curriculum' (2000) Alaska rural Systemic Initiative. <http://www.ankn.uaf.edu/handbook>, University of Alaska Fairbanks.

[16] Chapin, F. S., Cochran, Patricia, Huntington, Orville H., Knapp, Corrine N., Brinkman, Todd J., and Gadamus, Lily R., 'Traditional Knowledge, and Wisdom: A Guide for Understanding and Shaping Alaskan Social-Ecological Change., (2013) Springer Netherlands, v. 1, p. 49-62.

environmental integrity and sustainability. Western science, also known as "officially sanctioned science," is widely regarded as the preeminent school of thought in the scientific community at the present time. Relying solely on Western Science, however, can be seen as increasingly problematic and even counterproductive due to the fact that WS has been linked to many of the ecological catastrophes that have occurred around the world, such as the contamination of pesticides, the introduction of new species, dams and water diversions that have had an effect on salmon and other native species.

Because of the existence of cultural diversity, Western Science and Indigenous Science should be seen as coexisting or as parallel fields of study. Many westerners are unable to comprehend and value the idea of Indigenous science, despite the fact that they readily acknowledge the existence of Indigenous art, music, literature, and drama, as well as political and economic systems in Indigenous cultures. As a result, an assimilative approach to science education may be construed to have taken place when Western Science is taught without acknowledging Indigenous Science[17]. The common-ground perspective is essentially the overlap areas or coincidental areas of commonalities in these two concentric spheres. This also resonates with the worldview knowledge pools described in figure 4.

5. THE PACIFIC ISLAND ETHNOSPHERE (LANDSCAPES OF TRADITION)

This understanding of dual Worldviews can pave a path toward important perspectives within the Pacific Islands ethnosphere.[18] Broadly speaking, the Pacific Islands Ethnosphere (or PIE), is a collective of landscapes of tradition with complex cultural and ethnic identity of the various indigenous peoples. It encompasses their customs, beliefs, languages, traditional knowledge, practices, belief systems, cultural forms of expression, knowledge systems, and ways of life that have been passed down from generation to generation. The ethnosphere of the Pacific Islands is incredibly diverse, with thousands of distinct cultural groups across the region, each with its own unique traditions and heritage. This rich cultural heritage has been shaped by the islands' geography, history, and interactions with neighbouring cultures and colonial powers. Despite the many challenges faced by Pacific Islanders over the centuries, including colonization, forced assimilation, and environmental degradation, the ethnosphere of the region remains a vibrant and vital part

[17] Snively, G., Wanosts'a & Lorna Williams, "Chapter 1 – Braiding Indigenous Science with Western Science. In: Knowing Home: Braiding Indigenous Science with Western Science" (2018), Gloria Snively, Wanosts'a &Lorna Williams. <https://ecampusontario.pressbooks.pub/knowinghome2/> accessed 7 August 2023.

[18] The term "Pacific Islands ethnosphere" (or PIE) refers to the unique cultural and ethnic diversity found within the Pacific Islands region. It encompasses the various indigenous groups, languages, traditions, and customs that have evolved over thousands of years across the numerous islands and archipelagos in the Pacific Ocean. The Pacific Islands ethnosphere includes a wide range of cultural practices, including music, dance, art, and storytelling, as well as distinctive ways of life, such as fishing.

of the world's cultural heritage. What remains of the ethnosphere in the Pacific Islands overlap significantly with modern science, modernity, and transitions to modern society that have eroded or acculturated some cultures and societies that are presently in the brink of losing languages, traditions, and traditional knowledge.

Many of the Pacific islands such as Fiji, Marshall Islands, Kiribati, Tuvalu, and smaller habited atolls, are facing the challenges of the impacts of climate change plus loss of landscapes of tradition or cultural mores that have been progressively eroded over the past 100 years or less. Pathways of recovery of traditional knowledge and ancient wisdom are becoming less accessible because men and women elders are passing away, traditions are changing to modernization, coupled with the impacts of climate change that can inadvertently force many communities to relocate to habitable islands that offer more stable living environment and potable water. As described in a recent World Water Day in Fiji (2023), we are falling short of achieving SDG 6 (Clean Water and Sanitation) and SDG 13 (Climate Action), which integrates with agroecological principles and practices.[19]

6. ORIGIN MYTHS

According to Nunn,[20] there are many cultures in the world that have TK/LK based on their causal explanations of the past and present. Many traditional cultures particularly in Oceania and the South Pacific, manifest cultural ways of knowing and cultural forms of expression through dance, song, oral traditions, life stories or oral narratives, and continue to practice these beliefs or manifest them through belief systems that coincide with similar cultures in the Pacific[21]. Traditional knowledge or traditional ecological knowledge underpins many of the social norms of and attitudes that continue today although many regions are being acculturated quickly due to development, modernization, influx of tourism from New Zealand, Australia, Europe, and other countries plus gradual deterioration of traditional ways of knowing and transmitting that information to future generations. Origin myths in the Pacific Islands have intrigued scientist and researchers about things they cannot explain. There are (in most cases) reasons that Pacific Islands people thrived on telling these stories or myths. One of the more interesting ones was the origin myths "fished up" or "thrown down" by (demi) Gods. According to Nunn (2003):

> *"Myths recalling how islands were "fished up" or "thrown down" by (demi) gods are widespread in the Pacific Islands. Fishing-up myths*

[19] According to Issac et al (2018), Agroecology is a science, movement and practice that draws on social, biological, and agricultural sciences and integrates these with traditional knowledge, farmers' knowledge, and indigenous peoples' knowledge. Agroecology technologies are knowledge-intensive, builds on farmers' knowledge and experiences of farmers complemented by research from the scientific community.

[20] Nunn, P.D., 'Fished Up or Thrown Down: The Geography of Pacific Island Origin Myths' (2003) 93(**2**) Annals of the Association of American Geographers 350–36.

[21] Ibid

> *are more numerous and are concentrated in a heartland comprising parts of Samoa, Tonga, the southern Cook Islands, and the Society Islands of French Polynesia. Geological details in many fishing-up myths suggest these recall the activities of shallow submarine (jack-in-the-box) volcanoes, notably in Tonga, and that these myths diffused to places where such volcanoes do not exist. Other fishing-up myths-particularly those recalling rapid emergence and/or successive uplift events and tectonic instability during the process of fishing-up-are suggested as recalling coseismal-uplift events (uplift coincident with large earthquakes), which are comparatively common in islands along the convergent plate boundaries of the southwest Pacific (including parts of Tonga and New Zealand). Throwing-down myths are less common in the Pacific, being effectively confined to places (near) where volcanoes erupted within the period of human occupation. Throwing-down myths are interpreted as recalling volcanic eruptions".*

Nunn[22] mentions that Pacific Origin myths are linked to landscapes of traditions, and in part explain the dichotomies that exist in explaining two-opposing worldviews. Nunn describes these relationships as created or elaborated and cultural transformations based on previous cultural contacts[23],[24],[25],[26].

7. THE OLD VS. THE NEW: ANCIENT WAYS OF KNOWING AND KNOWLEDGE GATHERING AND TRANSMISSION IN A TECHNOLOGICAL AGE

Human beings over the centuries have had the abilities to rationalize and acquire different forms of knowledge; as this knowledge gathering (in many traditional societies) is still considered a lifelong process and spiritual commitment. Learning and knowledge acquisition begin in our mothers' wombs, long before we take our first steps, and last throughout her life until we pass away. Knowledge gathering itself is based on experience, practices, passed-on wisdom, and beliefs, guided by cultural forms of expression[27] cosmology, worldviews and transmitted or shared between individuals, families, communities, and cultures, thereby validating knowledge throughout the generations. Ancient ways of knowing need constant perpetuation; just as human survival is replicated

[22] Ibid.
[23] Latukefu, S, 'Church and State in Tonga', PhD thesis, Australian National University (1967).
[24] Mercer, P. M., 'Oral tradition in the Pacific: Problems of interpretation' (1979) 14 Journal of Pacific History 130–53.
[25] Gunson, N., 'Understanding Polynesian traditional history', (1993) 28 Journal of Pacific History 139.
[26] Teaero, T., 'Weaving a living from living cultures: challenges and opportunities. In: Koya, C.F., Nabobo-Baba, U. and Teaero, T. (editors), Education for Sustainable Development: Continuity for Sustainable Development. Volume 1. Suva, Fiji: School of Education, the University of the South Pacific and Asia/Pacific Cultural Centre for UNESCO: 149–165 (2010).
[27] Ibid.

by procreation, the constant pursuit of happiness, often manifested by personal and family well-being.

Many of Indigenous cultures and ideologies today are being tried and tested by both elders and young people; as most of these people are being 'immersed' in the myriad of technological and profound social and cultural change. A changing climate has also compounded these issues and inadvertently placed many Indigenous cultures in vulnerable or disadvantaged circumstances that are generally contradictory or ill favouring their long-term resiliency. From the author's perspective, these changes are intrinsically separating many cultures from their traditional histories, stories, languages, dances, foods, oral narratives, healing practices and ways of knowing, based on place-based societal-framed traditional knowledge (LK). The challenging part for many Indigenous cultures or communities is their abilities to cope (or adapt) themselves within a technological age that is progressively acculturating (or skewing) ancient ways of knowing and learning. Locally-based LK knowledge transmission and dissemination is profoundly being changed as a result of technological innovation and many cultures are 'losing themselves' within that technology that is quickly altering cultural landscapes of identity to the point of no return.

Photo 1: BriBri Awa apprentice (shaman or medicine man); (BriBri Talamanca, Costa Rica, December 2004). Photo: Orcherton (2012)[28]

Many authors consider technology and modern forms of communication *both a godsend and a curse;* an inevitable or consequential product or 'growth-factor' in this modern age and a necessary transition to

[28] Orcherton, D, 'Raising the bar: Recognizing the intricacies of cultural ecological knowledge in natural resource management' (2012) 12(3) BC Journal of Ecosystems and Management 55–82.

more up-to-date or modern forms of communication that allow greater connectivity, and, therefore, greater opportunities. Modern means of connectivity links or facilitates virtual social gatherings, friendships that perpetuate an almost insatiable personal need *to be connected*. As Internet services improve across the globe, and remote locations are being 'developed', traditional oral narratives are gradually being changed to *phone-narratives*, and SMS messages (described as shortened phone narratives) are, in many cases, completely out of context from the original narratives that are place-based and culturally specific (i.e. without the drama, hand and body movements, songs, dances and other holistic nuances that often accompanied the transmission of traditional narratives.

Other than video-clips, that could (feasibly) replace the detailed life stories or the indigenous cultures, many of these stories are being lost in translation or taken out of their cultural context and place in a narratives that have a language of their own are bombarding many indigenous cultures by social media propaganda, Facebook, Twitter, Instagram and other social media outlets, that are coursing their followers into the constant stream of "intriguing" information and knowledge"; that are now becoming more accepted in some traditional cultures or sharing circles as socially acceptable Indigenous forms of communication at the expense of traditional ways of knowing that were built on ancestral beliefs. Many of the other generations are changing modalities, lifestyle choices, food habits, which has been having a significant impact on Indigenous cultures throughout the Pacific and the Americas. What is really happening is that there is a loss of cultural contact and tacit knowledge building within different generations that aids in the factual transmission that in many traditional cultures. This was (and still is) an important holistic journey to understand the entire context, practices and belief systems embedded in Indigenous cosmologies and worldviews. Technology in many respects has severed these intricate holistic relationships and is broken knowledge acquisition links that took centuries to build.

In Lorler's (1989) book "Shamanic healing: within the medicine wheel ([29] in [30]) the author describes shamanism in the cosmic conception of the world:

> "*Shamanic cosmic tree represented the axis of the earth; the axis of the solstice with its two poles. The summer and winter soloist, the highest and lowest points of the sun, its death and rebirth. Polaris, around which all the stars rotate, was a gateway to the heavens. Everyplace that gave access to supernatural beings was designated the center of the earth in ancient times. This resulted in the identification of the cosmic tree as a center of the world and*

[29] Lorler, M-Lu, 'Shamanic Healing Within the Medicine Wheel'. Brotherhood of Life (1989). <https://www.abebooks.com/9780914732235/Shamanic-Healing-Medicine-Wheel-Marie-Lu-0914732234/plp> accessed on 07 August 2023.

[30] Crabbé, R., 'The Axis Mundi. The Shamanic Tree of Life' (2022) <https://www.roelcrabbe.com/articles-about-shamanism/the-axis-mundi/> accessed on 07 August 2023.

> *subsequently in its consecration. In every tree the ancients saw the connection of the earthly with the divine because its validity expresses this through its roots, penetrating into the taps of the darkness to give strong support, and with its crown, striding towards the light with his unfolding branches. Ancient man could still open up in trust to this knowledge of the tree, for the shamans it was the most important place because it helped them in their breakthrough into the realm of the gods."*

If we were to reflect on the same discourse within the context of postcolonial modernism, this description would likely change and its meaning, or is diluted, or its deep meaning blanketed or hidden behind Western science interpretation of holistic traditional relationships. This is a bit of a double-edged sword, as divergent worldviews, by virtue of the fact that we are struggling with the development process into and with trying to hold on to traditional ways of knowing indigenous cultures. Many authors consider blending modern Western or Eurocentric science with traditional knowledge, may be the only way to justify these rapid and unprecedented changes. There is probably a compromise to be made but there are likely to be some connective points made between these two divergent worldviews.

The author views these relationships from a more integrated, pragmatic approach (Figure 4). Cultural Ecological Knowledge or CEK is a subset of LK or local knowledge (LK), and considered an emergent-property[31],[32],[33] that encompasses the cultural context, practice, and beliefs, emphasizing the qualities and attributes of places that have aesthetic, historic, scientific or social-value for past, present, or future generations. Immersed in this are the processes of production, diffusion, and application of knowledge systems. Teaero (2010) also places CEK within the concept of cultural forms of expression[34], which, according to UNESCO[35], are traditional cultural expressions (TCEs), such as folklore (or traditional and popular culture) comprising the totality of traditional-

[31] Basically, a philosophical term taking into consideration systems theory, science, and art. Emergence is the way complex systems and patterns arise out of a multiplicity of relatively simple interactions. <http://www.google.com/search?q=define%3A%20emergent-property> accessed on 30 March 2023.

[32] Mercer, P. M., 'Oral tradition in the Pacific: Problems of interpretation', (1979) 14 Journal of Pacific History 130–53.

[33] Gunson, N., 'Understanding Polynesian traditional history' (1993) 28 Journal of Pacific History 139.

[34] Cultural forms of expression are traditional cultural expressions (TCE's), are creations of the cultural community, expressed by a group or individuals and recognized as reflecting expectations of the community insofar as they reflect its cultural and social identity. Its standards and values are transmitted orally, by imitation or by other means. CE (cultural expressions) is among others, language, literature, music, dance, games, mythology, rituals, customs, handicrafts, architecture, and other arts (PIC/CE/34/8, 2011). This includes the notion of biocultural heritage, previously outlined.

[35] UNESCO, 'Local and Indigenous knowledge system' (2011) <http://www.unesco.org/new/en/natural-sciences/priority-areas/links> accessed on 3 March 2023.

based creations of the cultural community[36]. Aboriginal world-views are in an appropriate balance with components of scientific rigor, validation, and ethics, coinciding in some ways with the academic (compartmentalized or disciplinary) structure of Western Science. In the real-world however, attempts to integrate the two types of science have only been covered by a few theoretical papers, and often have left the bearers of CEK out of the discussion.

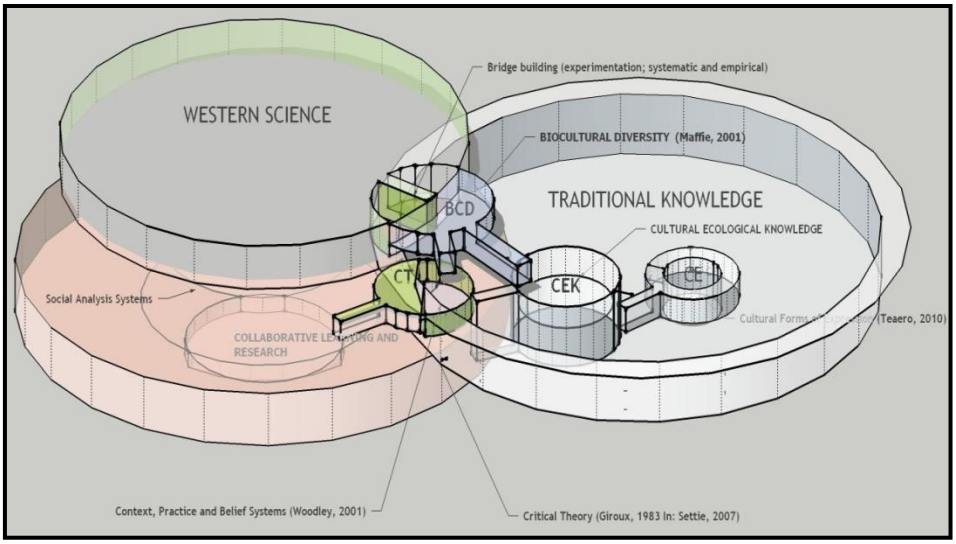

Figure 5: Schematic representation of two worldview "pools" and differences between Western Science, Traditional Knowledge, and CEK. A third (pink) pool is collaborative learning (CL), participatory research and social analysis systems (SAS)[37]

The overlapping spheres illustrated (conceptually) in figure 4 describe CEK as a sub-set of the traditional knowledge "pool". Biocultural Diversity[38] (BCD) has a more direct (functional) relation with Western Science and Traditional Knowledge (TK) as an emergent property[39]. CT (Critical theory) is a tool of inquiry to illuminate pertinent and complex issues addressing Indigenous Knowledge ([40], In:[41],[42]). CE (Cultural Forms

[36] Orcherton, D., 'Raising the bar: Recognizing the intricacies of cultural ecological knowledge in natural resource management' (2012) 12(3) BC Journal of Ecosystems and Management 55–82. <http://jem.forrex.org/index.php/jem/article/view/48/102> accessed on 30 March 2023.

[37] Ibid.

[38] This includes the notion of biocultural heritage, previously outlined.

[39] Woodley, E., 'Local and Indigenous ecological knowledge as an emergent property of a complex system: A case study in the Solomon Islands'. Thesis, University of Guelph, Guelph (2002) <http://westernsolomons.uib.no/docs/Woodley,%20Ellen/Woodley%20(2002)%20Local%20K> accessed on 30 March 2023.

[40] Giroux, H.A., 'Theory and resistance in education: A pedagogy for the opposition'. Bergin & Garvey Publishers, New York (1983).

[41] Settee, P., 'Pimatisiwin: Indigenous knowledge systems, our time has come'. PhD. Thesis. The University of Saskatchewan (2007) <https://harvest.usask.ca/handle/10388/etd-04302007-084445> accessed on 30 March 2023.

of Expression)[43] are traditional cultural expressions which is folklore, traditional and popular culture, comprising the totality of traditional-based creations of the cultural community. Even though divergent world-views exist, there are interconnecting "bridges" or "linkages" between these different ways of knowing. Biocultural Diversity (BCD) and Critical Theory (CT) and collaborative learning (CL) are the three main connective points between Western Science and TK.[44]

8. TOWARDS PRACTICAL APPROACHES TO MERGING CEK AND WESTERN SCIENCE

Bannister and Hardison[45] (2006) describe the merger of CEK and Western Science as:

> "*adequately and potentially detrimental to both biological diversity and those indigenous, traditions and local communities whose existences and well-being are interdependent with biological and ecological systems*" [46],[47].

Within a more practical description of cultural heritage and indigenous knowledge, there are many inter-related social and cultural complexities regarding natural resource management, especially when Aboriginal groups try to implement or bring about positive change to the sustainable management of their resources. Conflict usually arises based on divergent viewpoints or other misrepresentation with Western thought. Vilsoni Herenko, a Maori (New Zealander) researcher, adequately describes what has happened culturally over the years, which resonates with some First Nation's realities:

> *"Chief among the reasons for pushing indigenous sources of knowledge to the margins is the process of colonization and acculturation, particularly the usurpation of oral narratives by the dominant culture's narrative fiction; fairy tales, myths and legends, short stories novels and biblical stories: The school and church are institutions that work "hand-in-hand" to colonized and acculturated*

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[42] Chapin III, F Stuart & Cochran, Patricia & Huntington, Orville & Knapp, Corrine & Brinkman, Todd & Ray, L., 'Traditional Knowledge and Wisdom: A Guide for Understanding and Shaping Alaskan Social-Ecological Change', (2013). https://doi.org/10.1007/978-94-007-7470-4_4.

[43] Teaero, T., 'Weaving a living from living cultures: challenges and opportunities. In: Koya, C.F.; Nabobo-Baba, U. and Teaero, T. (editors). Education for Sustainable Development: Continuity for Sustainable Development. Volume 1'. Suva, Fiji: School of Education, the University of the South Pacific and Asia/Pacific Cultural Centre for UNESCO: 149–165 (2010).

[44] Orcherton, D., 'Raising the bar: Recognizing the intricacies of cultural ecological knowledge in natural resource management' (2012) 12(3) BC Journal of Ecosystems and Management 55–82. http://jem.forrex.org/index.php/jem/article/view/48/102> accessed on 12 July 2023.

[45] Bannister, K., and Hardison, P., 'Re-envisioning the nature of useful knowledge: A perspective from indigenous knowledge systems' (2006) 77(6) The Journal of Higher Education 1046-1068.

[46] Orcherton, D, 'Raising the bar: Recognizing the intricacies of cultural ecological knowledge in natural resource management' (2012) 12(3) BC Journal of Ecosystems and Management 55–82. <http://jem.forrex.org/index.php/jem/article/view/48/102> accessed on 12 July 2023.

[47] Woodley, E., 'Local and Indigenous ecological knowledge as an emergent property of a complex system: A case study in the Solomon Islands'. Thesis, University of Guelph, Guelph (2002). <http://westernsolomons.uib.no/docs/Woodley,%20Ellen/Woodley%20(2002)%20Local%20K> accessed on 12 July 2023.

> *the mind. As native people we are taught to read and write... they paid less and less attention to oratory, and historians marginalized emotional truth..."*[48] (p. 82–83).

Photo2: BriBri Spiritual Leader) explaining the importance of plant diversity; (BriBri Talamanca, Costa Rica, December 2004).Photo: Orcherton (2012)[49]

Recent PhD thesis work by a First Nations Swampy Cree woman, Precilla Settee[50] (2007), also partially explains the dilemma faced by indigenous researchers:

> *"I found that legitimated discourses of power privilege what books may be read by students, validate what instructional methods may be utilized, and authorize what belief systems and views of achievement may be taught. In so doing, power discourses undermine the cultural interpretations of language establishing one correct reading that implants a particular hegemonic message into the consciousness of Indigenous readers"*[51].

The oral history of northwestern Pacific Coast of British Columbia for example, was used to enhance archaeological research in the Dundas

[48] Hereniko, V., 'Indigenous knowledge and academic imperialism. In: Remembrance of Pacific pasts: An invitation to remake history.' R. Borofsky (editor). University of Hawaii Press, Honolulu, HI (2000). <http://www.hawaii.edu/cpis/files/IndigKnow.pdf> accessed on 12 July 2023.

[49] Orcherton, D, 'Raising the bar: Recognizing the intricacies of cultural ecological knowledge in natural resource management' (2012) 12(3) BC Journal of Ecosystems and Management 55–82.

[50] Settee, P., 'Pimatisiwin: Indigenous knowledge systems, our time has come'. PhD. Thesis. The University of Saskatchewan (2007) <https://harvest.usask.ca/handle/10388/etd-04302007-084445> accessed on 12 July 2023.

[51] Ibid

Islands situated in the mouth of the Skeena River[52]. The Tsimshian cultural landscape as defined was seen as important in order to help "dispel the myth that social complexity arose here [on the Northwest Coast] in the absence of food production by demonstrating that the 'hunter-gatherers' of the region were not simple 'affluent foragers,' but active managers who have cultivated, sustained, overseen, and promoted culturally valued plant resources"[53]).

Hunn (1999)[54] writes in a chapter titled "*The Value of Subsistence for the Future of the World*" that "*no longer can we take refuge behind the myth of the superiority of Western Civilization as the source of all science.*" He goes on to describe the importance of documenting and learning from the CEK of indigenous peoples the world over, knowledge that enabled them to adapt to diverse local environments. Hunn muses that this maybe the key to the future sustained subsistence of the human species[55].

It invariably comes down to *how* the dominant culture (non-Aboriginal) is attempting to rationalize and integrate distinct world views based on diverse cultural values and beliefs. What we often *see* are Aboriginal people's manifested (or indoctrinated) examples of resilience to change at the community level. Human-ecological resilience at this level encompasses an entire community (physical infrastructure, economic, cultural, and social capital, natural environment, and systems/essential services) and its ability to resist and/or rapidly recover from extreme events[56],[57]. This has profound effects on *how* Aboriginal people view or rationalize non-Aboriginal involvement (and *visa-versa*) in natural resource management. According to Berry[58], this is initiated by the conjunction of two or more autonomous cultural systems; termed *Acculturation.*[59]

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52 This research project by Northwest Community College and UBC scientists use the oral history of the Tsimpshian and what are now the Tahltan, was undertaken to explain the sequence of events about village constructions in the estuary of the Skeena River some 7,000 years ago (JEM Reviewers personal comments, June 2011).

53 Downs, K., 'The Tsimshian homeland: An ancient cultural landscape'. Thesis. Athabasca University, Athabasca, AB (2006).

54 Hunn, E., 'The value of subsistence for the future of the world. In: Ethnobiology: Situated knowledge/located lives.' V. Nazarea (editor), University of Arizona Press, Tucson, AZ (1999).

55 Ibid, n.52

56 Cutter, S. L., Barnes, L., Berry, M., Burton, C., Evans, E., Tate, E., & Webb, J., 'A place- based model for understanding community resilience to natural disasters' (2008) 18(4) Global Environmental Change 598-606.

57 This is often as a result of because of shocks or stresses within a dominant Western Science (or Eurocentrism). Western Science contends that knowledge of Eurocentrism's history is a necessary component a new cultural politics of difference (36, 204). Academics and others are accustomed to ethnographic encounters that reveal the cultural belief-sets of Aboriginal and other peoples. They are unaccustomed, however, to the application of similar analysis to the "White way" (36: 24).

58 Berry, J., 'Conceptual approaches to acculturation. In: Acculturation: Advances in theory, measurement and applied research. In: K.M. Chun., P.B. Organista, and G. Marin (editors), Decade of behaviour 2000–2010. American Psychological Association, Washington, DC (2003).

59 Acculturation within an anthropological context describes is a process in which members of one cultural group adopt the beliefs and behaviours of another group.

According to Hazuda et al (1988)[60], although acculturation is usually in the direction of a minority group adopting habits and language patterns of the dominant group, acculturation can be reciprocal--that is, the dominant group also adopts patterns typical of the minority group. Assimilation of one cultural group into another may be evidenced by changes in language preference, adoption of common attitudes and values, members' hip in common social groups and institutions, and loss of separate political or ethnic identification (p.34). Berry and Orcherton[61],[62] also describe acculturative "change" as the consequence of direct cultural transmission or derived from non-cultural causes, such as ecological or demographic modification induced by a dominant or impinging culture (Social Science Research Council, 1954: In[63]). Though interesting and indirectly related to how we interpret CEK, this theme falls outside the scope of this article. Coincidental theoretical (and some practical) work on resilience analysis[64] shows us there is a partial explanation for these differences. Dyer & Mc Guinnes, reiterate however that 'resilience analysis describes a process whereby people bounce back from adversity and go on with their lives. It is a dynamic process highly influenced by protective factors. Protective factors are specific competencies that are necessary for the process of resilience to occur' (p.277).

Whether the description is "aboriginal or non-aboriginal", what seems to be on most resource managers' minds is *how* can we better understand these complexities and *what* are the tools and techniques that can be used to facilitate or understand and putting into practice mutually acceptable or cooperative relationships based on these two distinct types of science. What we are witnessing (as mentioned) are contrasting world-views and notable differences in the way these resources are perceived, interpreted, and managed. Lynam et al.,[65] and Hoffman[66] explain some of the tools and methods to incorporate community and indigenous knowledge into decision-making in natural resources management, which break-away from the conventional thinking (technical or scientific approach) on natural resource management and provide holistic

[60] Hazuda, H. P., Stern, M. P., & Haffner, S. M., 'Acculturation and assimilation among Mexican Americans: Scales and population-based data', (1988) 69(3) Social Science Quarterly 687-705.

[61] Berry, J., 'Conceptual approaches to acculturation. In: Acculturation: Advances in theory, measurement and applied research. In: K.M. Chun., P.B. Organista, and G. Marin (editors), Decade of behaviour 2000–2010. American Psychological Association, Washington, DC (2003).

[62] Orcherton, D., 'Raising the bar: Recognizing the intricacies of cultural ecological knowledge in natural resource management' (2012) 12(3) BC Journal of Ecosystems and Management 55–82. <http://jem.forrex.org/index.php/jem/article/view/48/102> accessed on 12 July 2023.

[63] Chun, K.M., P.B. Organista, and G. Marin (editors), 'Acculturation: Advances in theory, measurement and applied research. Decade of Behaviour 2000–2010'. American Psychological Association, Washington, DC (2003).

[64] Dyer, J.G. and T.M. McGuinnes., 'Resilience: Analysis of the concept', (2004) 10(5) Archives of Psychiatric Nursing 276–282.

[65] Lynam, T., de Jong, W., Sheil, D., Kusumanto, T. and Evans, K., 'A review of tools for incorporating community knowledge, preferences and values into decision-making in natural resources management' (2007) 12(1) Ecology and Society 1–15.

[66] Hoffman, R., 'Rekindling the fire: The impact of Raymond Harris's work with the plains Cree' Doctoral Dissertation, Trent University, Peterborough, Ontario (2006).

Aboriginal world-views, attitudes, beliefs, or preferences of the people managing or depending on their resources[67],[68]. This is especially true when looking at cultural/ecological values in forest resource and land-use management where some intrinsic differences exist between these types of management and the science behind these approaches.

As evidenced in these and other experiences, "aboriginal perspectives" can be incorporated in an atmosphere of mutual respect; cooperation and support for the values encompassed in the Indigenous world-view are firmly established in the hearts and minds of all participants[69]. Openness to innovative programming compatible with Indigenous teaching and learning styles and strong commitment to a shared vision are characteristics, which lay the foundation for including Indigenous knowledge[70],[71]. To better understand these processes, we need to look at ways of bridging-the-gap between two distinct types of science; Western Science and Indigenous or Aboriginal Science. Though not definitive or exhaustive in scope by any means, the following five (5) approaches can be examined as a practical means of approaching, describing and/or finding a solution to this dichotomy:

1. Acknowledging aboriginal peoples' own perceptions and contributions to science.
2. Creating social-legitimacy through Collaborative Learning and integrating systems thinking and conflict management.
3. Design and implement intuitive valuations of CEK (transfer of Oral to Written cultural/ecological knowledge).
4. Designing clear objectives and outcomes and implementing systematic and culturally sensitive heritage assessments, and
5. Defining cultural pluralism (ideology of world-views) and problem-solving strategies within a continuous acculturation process.

Within the Western-viewed Stanford Dictionary of Philosophy[72] (32):

> *"Information technology is now ubiquitous in the lives of people across the globe. These technologies take many forms such as personal computers, smart phones, the internet, web and mobile phone applications, digital assistants, and cloud computing. In fact, the list is growing constantly, and new forms of these technologies are*

[67] Ibid, n.60

[68] Orcherton, D., 'TEK/(Traditional Ecological Knowledge) and Biodiversity Conservation: Strengthening Community-Based Approaches (CBA) to conservation and building equitable partnerships in practice with indigenous peoples of Costa Rica' (2012) 32 The Journal of Pacific Studies 87–90.

[69] Smith, L. T., 'Decolonizing methodologies: Research and Indigenous peoples'. Zed Books (1999).

[70] Ibid.

[71] Woodley, E., 'Local and Indigenous ecological knowledge as an emergent property of a complex system: A case study in the Solomon Islands'. Thesis. University of Guelph, Guelph (2002) <http://westernsolomons.uib.no/docs/Woodley,%20Ellen/Woodley%20(2002)%20Local%20K> accessed on 12 July 2023.

[72] Stanford Encyclopedia of Philosophy. (2014). Information Technology <https://plato.stanford.edu/> accessed on 12 July 2023.

> *working their way into every aspect of daily life. In some cases, such as can be seen in massive multiplayer online games, these technologies are even opening new ways of interacting with each other. Information technology at its basic level is technology that records, communicates, synthesizes, or organizes information. Information can be understood as any useful data, instructions, or meaningful message content. The word literally means to "give form to" or to shape one's thoughts. So, a basic type of information technology might be the proverbial string tied around one's finger to remind or inform you that you have some specific tasks to accomplish today. Here the string stands in for a more complex proposition such as "buy groceries before you come home." The string itself is not the information, it merely symbolizes the information and therefore this symbol must be correctly interpreted for it to be useful. Which raises the question, what is information itself?*

Actions currently being taken by Indigenous people in communities throughout the world clearly demonstrate that a significant "paradigm shift" is under way in which indigenous knowledge and ways of knowing are beginning to be recognized as consisting of complex knowledge systems with an adaptive integrity of their own (cf. Winter, 2004 special issue of Cultural Survival Quarterly on indigenous education). As this shift evolves, it is not only indigenous people who are the beneficiaries since the issues that are being addressed are of equal significance in non-Indigenous contexts. Many of the problems that are manifested under conditions of marginalization have gravitated from the periphery[73] to the center of industrial societies, so the new (but old) insights that are emerging from indigenous societies may be of equal benefit to the broader educational community.

9. CONCLUSION: REFRAMING TK/LK TOWARDS A BLEND OF INDIGENOUS SCIENCE AND WESTERN SCIENCE

In this brief analysis, we have reviewed several salient points about TK/LK and its relation to climate change, and Western/Eurocentric Science, and how IS can be integrated effectively. The common-ground perspective identified overlap areas or coincidental areas of commonalities of two opposing worldviews. It was determined that coincidental areas of overlap must be identified and ways of knowing must be preserved for future generations. Pragmatically, there is a paradigm shift occurring with the younger generation, and TK/LK and IS being acculturated and gradually eroded. The Pacific Islands Ethnosphere (or PIE) is the landscape of tradition with complex cultural and ethnic identities of the various Indigenous peoples who are linked to Pacific Origin myths.

[73] Bates, P., Chiba, M., Kube, Sabine, K and Nakashima, D.,' Learning and knowing in indigenous societies today UNESCO publication (2009).

This (in-part) explains the dichotomies that exist in explaining two-opposing worldviews. Nunn[74]described these relationships as "created or elaborated" and cultural transformations based on cosmology, worldviews and transmitted or shared between individuals, families, communities, and cultures, thereby, validating knowledge throughout the generations. Ancient ways of knowing need constant perpetuation, just as human survival is replicated by procreation, the constant pursuit of happiness, often manifested by personal and family well-being. The Medicine-wheel and Shamanic healing are examples of manifested Indigenous Science (IS), within a certain context, practice, and belief system, exemplifies cultural forms of expression. Aboriginal or Indigenous worldviews are usually in balance with components of scientific rigor, validation, and ethics, coinciding in some ways with the academic (compartmentalized or disciplinary) structure of Western or Eurocentric Science. Western Education has brought about significant paradigm shifts having impacted Indigenous populations in many areas of the Pacific and in the Americas. In most cases, it has marginalized Indigenous knowledge systems and dismissed or devalued LK, leading to a loss of confidence and interest in traditional knowledge among younger generations.

By exploring traditional knowledge and climate change, support was strengthened towards a better understanding of the complexities of the duality of ancient wisdom and modernity, and in doing so, created a better understanding of the importance of these opposing worldviews and how science ancient wisdom and technology/modernism can be better interpreted and understood. The author explored meaningful interdisciplinary perspectives and explained coincidental relationships, components of bridging TK/LK and transforming the compartmentalized view of science within a more holistic understanding of traditional ways of knowing.

Looking closer at LK/IK/IS and Western Science intersections require researchers to think more holistically and take a more practical approach to integrating two worldviews. This brief analysis also aided the reader to recognize and respect the value of traditional knowledge systems and the need to work closer with Indigenous communities to protect and promote their cultural practices and knowledge.

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AUTHOR'S DECLARATION AND ESSENTIAL ETHICAL COMPLIANCES

Author's Contributions (in accordance with ICMJE criteria for authorship)
This article is 100% contributed by the sole author. S/he conceived and designed the research or analysis, collected the data, contributed to data analysis & interpretation, wrote the article, performed critical revision of the article/paper, edited the article, and supervised and administered the field work.

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The author(s) solemnly declare(s) that this research has not involved any human subject (body or organs) for experimentation. It was not a clinical research. The contexts of human population/participation were only indirectly covered through literature review. Therefore, an Ethical Clearance (from a Committee or Authority) or ethical obligation of Helsinki Declaration does not apply in cases of this study or written work.

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The author(s) solemnly declare(s) that this research has not involved any animal subject (body or organs) for experimentation. The research was not based on laboratory experiment involving any kind animal. The contexts of animals not even indirectly covered through literature review. Therefore, an Ethical Clearance (from a Committee or Authority) or ethical obligation of ARRIVE does not apply in cases of this study or written work.

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The author(s) has/have NOT complied with PRISMA standards. It is not relevant in case of this study or written work.

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